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ABSTRACT

Gender differences in various aspects of cognitive ability may be related to cultural sex roles. This paper examines gender differences in learning styles among three groups of Canada Natives. Canfield's Learning Styles Inventory, Form E, was administered to 280 Cree, Dene, and Metis (mixed-blood) students in Grades 7-9 in northern Saskatchewan communities with relatively intact Native cultures. Results indicated that, compared to Cree and Metis students, Dene students were less negative toward competitive learning situations; were less negative toward learning through written materials; and showed less preference for seeing movies, slides, and graphs. In addition, Dene students showed less preference for learning by direct experience than did Cree students. Cultural differences in learning style only partially overlapped gender differences within each cultural group. For all three groups, males had less preference than females for studying under clearly directed instruction by a classroom teacher, and males had more preference than females for such work as repairing, building, and operating equipment. There were no intergroup differences in these two areas, suggesting that these gender differences may be universal. On the other learning style scales, Cree and Metis students, but not Dene students, had similar patterns of within-group gender differences. Since these Metis students are Cree-European mixed-bloods, these similar patterns may reflect common cultural and linguistic influences. (SV)

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GENDER DIFFERENCES
IN LEARNING STYLES OF CREE, DENE AND METIS STUDENTS

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The existence of gender differences is mostly found in four areas of psychological studies; aggression, spatial ability, verbal ability and mathematical ability. Maccoby (1980) found that males tend to be more aggressive than females. In tasks of spatial ability, Linn and Peterson (1986) indicated that males tend to surpass females in the speed of rotating objects in space. The gender differences in spatial performance tend to appear reliably by age 10 (Johnson & Meade, 1987). In verbal ability, females tend to have a slightly higher average than males in verbal ability tasks such as spelling and comprehension (Finucci & Childs, 1981), which does not become evident until primary school (Linn & Peterson, 1986). In mathematical ability tasks, males tend to obtain higher scores than females (Benbow & Stanley, 1980 & 1983; Randhawa & Hunt, 1987).

Assuming that culture's sex roles influence various aspects of cognitive abilities (Van Leeuwen, 1978), the gender differences in the above psychological areas can be affected by sex roles existing in the specific culture. Native peoples in Canada are often regarded as a single cultural group. When compared to Cree and Metis (half-breeds of Cree and non-Natives), Dene (the tribal name is Chipewyan) have a distinct cultural and linguistic background. Thus, the study focused on gender differences in learning styles within the Cree, Dene and Metis Native groups. To achieve this goal, the study tested the following three steps of research hypotheses: (1) differences would be found in the preferred learning styles of students of Cree, Dene and Metis backgrounds; (2) differences would be found in the preferred learning

styles of male and female students within each group; and (3) cultural differences between Cree, Dene and Metis in preferred learning styles would differ from sex differences within each cultural group.

METHOD OF THE STUDY

Sample

The researcher focused on the areas of Northern Saskatchewan where a variety of small communities had relatively intact Native cultures. Six schools in the northwest area of Northern Saskatchewan were selected. The sample was comprised of 280 students. Based on students' self-perceptions of cultural backgrounds, there were as 81 Cree, 65 Dene and 134 Metis. The sample consisted of 129 male students and 151 female students: 35 males and 46 females for Cree; 27 males and 38 females for Dene; and 67 males and 67 females for Metis. There is no significant difference in the sample classified on the basis of cultural differences. Average ages were 14 years and two months for Cree, 15 years and three months for Dene, and 14 years and one month for Metis.

Instruments

The instrument used in this study was Canfield's Learning Styles Inventory: Form E (Canfield, 1980). CLS-Form E is designed to measure the learning style preferences of individuals. It is composed of 30 items which require the subject to rank four options in order of preference. It is to be used with students who have Grade 5 reading levels or above. The mean of 15.00 for CLS-Form E indicate neither a

high nor a low preference in each learning style scale. Since a first choice on each item (question) gives a score of one, the lower the score the higher the preference.

There are three categories for 16 learning scales common to CLS-Form E: (1) Conditions, (2) Content and (3) Mode. The Condition category, divided into eight scales, measures student preferences for learning conditions and measures those conditions under which students perform best. The Content category, consisting of the four different scales of a typical curriculum, measures the comparative interest of students and teachers in the curriculum. The Mode category, consisting of four different preferred instructional processes from the learners' perspective, measures comparative preferences for the different modes of learning and instructional processes.

Procedure

The researcher visited six schools in Northern Saskatchewan between February and April, 1986. In each school, CLS-Form E was administered during class time to groups of students from Grades 7 to 9. Since some students were observed to have difficulties comprehending the questions of the inventory written in English, they were excluded from the study on the advice of class teachers.

RESULTS

1. Differences between Cree, Dene and Metis Students in the Learning Style Scales

The group differences in learning style scales were analyzed using a one-way ANOVA. Significant differences were found in four learning style scales: Competition [$F(2,277) = 5.45, p < .01$], Reading [$F(2,277) = 6.55, p < .01$], Iconics [$F(2,277) = 5.10, p < .01$] and Direct Experience [$F(2,277) = 3.34, p < .05$] scales showed differences among the means of Cree, Dene and Metis student groups.

The Student Newman Keuls (SNK) tests for differences between means revealed significant differences between Dene ($M = 15.80$), Cree ($M = 16.88$) and Metis ($M = 17.24$) students on the Competition scale. This result suggested that Dene students showed less negative reaction towards a competitive learning situation than did Cree and Metis students. On the Reading scale, the SNK tests showed significant differences between the means of Dene ($M = 15.25$), Metis ($M = 16.84$) and Cree ($M = 17.17$) students. Although Dene students expressed a low preference for learning through written materials in the mean score, the result suggested that Dene students had the least negative reaction of the three groups to learning through written materials. On the Iconic scale, the SNK tests showed significant differences between the means of Metis ($M = 13.05$), Cree ($M = 13.20$) and Dene ($M = 14.74$) students. The result indicated that Cree and Metis students had a significantly higher preference for seeing movies, slides, pictures and graphs as a mode of learning than did Dene students. On the Direct Experience scale, the SNK tests for differences among means showed significant differences between Cree ($M = 13.14$) and Dene ($M = 14.57$) students. This result indicated that Cree students expressed a significantly higher preference for learning by direct experience than did Dene students.

2. Gender Differences In the Learning Style Scales of Cree, Dene and Metis Students

A series of 3 (culture) x 2 (sex) MANOVA for the scores of the learning style scales were used to examine the interactions of culture and sex. There were no interactions between sex and culture in any of the scales. Therefore, with the aim of comparing gender differences in learning style within each cultural group, a series of one-way ANOVA were used to analyze gender differences in the learning style scales for Cree, Dene and Metis. The results are reported in Table 1 with the means of male and female students from the three cultural backgrounds.

(1) Learning Condition Category

In the learning condition category, a series of one-way ANOVA indicated five significant gender differences out of the eight learning style scales at the 0.05 level. Cree and Metis students showed significant differences based on gender concerning all of these five scales: Goal Setting [$F(1,79)=4.61, p<.05$] for Cree and [$F(1,132)=4.87, p<.05$] for Metis; Instructor [$F(1,79)=9.40, p<.01$] for Cree and [$F(1,132)=6.30, p<.05$] for Metis; Detail [$F(1,79)=5.66, p<.05$] for Cree and [$F(1,132)=4.09, p<.05$] for Metis; Independence [$F(1,79)=5.85, p<.05$] for Cree and [$F(1,132)=19.73, p<.001$] for Metis; and Authority [$F(1,79)=7.45, p<.01$] for Cree and [$F(1,132)=21.45, p<.001$]. Since the mean of 15 points on every learning style scale indicates neither a high nor a low preference, these results of one-way ANOVAs among Cree and Metis students, suggested (see the means of Table 1) that (1) male

Table 1

Means and Results of One-Way ANOVA of Learning Style Scales for Male and Female Students with Cree, Dene and Metis Cultural Backgrounds

Scale	Cree		Dene		Metis	
	Male (n=35)	Female (n=46)	Male (n=27)	Female (n=38)	Male (n=67)	Female (n=67)
(1) Conditions						
Peer	13.17	12.83	14.07	13.63	13.03	12.16
Organization	15.63	14.28	15.19	14.45	14.27	14.25
Goal Setting	14.43	15.87*	14.89	16.16	15.33	16.46*
Competition	16.71	17.00	15.85	15.76	17.37	17.10
Instructor	12.34	14.48**	12.81	14.05	12.40	13.85*
Detail	15.14*	13.54	14.41	14.24	14.51*	13.43
Independence	15.69	17.52*	16.00	16.92	16.22	18.52***
Authority	16.83**	14.67	16.78*	14.79	16.85***	14.19
(2) Content						
Numeric	15.97	16.52	14.63	15.32	16.33	16.15
Qualitative	17.37**	14.87	15.56	14.18	15.94**	14.28
Inanimate	10.51	12.96**	11.52	14.53***	11.13	14.30***
People	16.23	15.61	18.33***	15.95	16.57*	15.25
(3) Mode						
Listening	16.43	16.54	16.11	15.11	16.19	15.88
Reading	17.77	16.72	15.63	14.97	16.73	16.96
Iconics	13.00	13.35	13.26	15.79**	12.36	13.75*
Direct	12.80	13.39	15.19	14.13	14.72*	13.42
Experience						

Note 1: The mean of 15 points indicates neither a high nor a low preference. The lower the mean the higher the preference, and the higher the score the lower the preference. Note 2: *, **, and *** indicate that the designated mean is significantly greater than the other in the univariate ANOVA test: * $p < .05$; ** $P < .01$; *** $P < .001$.

students preferred to have their own objectives more than female students (Goal Setting), (2) female students preferred to know their instructor personally more than male students (Instructor), (3) female students required specific information on their subject matters more than male students (Detail), (4) female students indicated a negative preference for working alone and independently more than male students (Independence), and (5) male students had a negative preference for classroom discipline more than female students (Authority). On the other hand, Dene students showed a significant gender difference in only one scale, Authority [$F(1,63)=6.50, p<.05$], suggesting the same results as Cree and Metis students in that male Dene students showed a negative preference for obeying authority more than female Dene students did.

(2) Learning Content Category

Three significant gender differences were found in the Cree, Dene and Metis cultural groups based on the four learning style scales in the learning content category. For Qualitative, the Cree and Metis students indicated significant gender differences, [$F(1,79)=9.76, p<.01$] for Cree and [$F(1,132)=10.14, p<.01$] for Metis, suggesting that the male Cree and Metis students showed a negative preference for learning about words and language more than did the female Cree and Metis students. For Inanimate, all three groups showed significant gender differences: [$F(1,79)=10.26, p<.01$] for Cree, [$F(1,63)=12.56, p<.001$] for Dene, and [$F(1,132)=30.29, p<.001$] for Metis. These results imply that the male students preferred to learn about working with things (e.g., building, repairing, designing) more than did the female students, regardless of

their cultural backgrounds. For People, the Dene and Metis students displayed significant gender differences, [$F(1,63)=12.75$, $p<.001$] for Dene, [$F(1,132)=5.71$, $p<.05$] for Metis, suggesting that the male Dene and Metis students had a greater negative preference to learn about working with people (e.g., interviewing, counseling, selling) more than did female students.

(3) Learning Mode Category

Two significant gender differences were found regarding the four learning style scales in the learning mode category. For Iconics, the Dene and Metis students indicated significant gender differences, [$F(1,63)=7.88$, $p<.01$] for Dene and [$F(1,132)=4.93$, $p<.05$] for Metis. These results suggest that the male Dene and Metis students preferred to learn by viewing visual materials (e.g., movies, slides, pictures) more than did female students. For Direct Experience, the Metis students showed a significant gender difference, [$F(1,132)=4.60$, $p<.05$], suggesting that the female Metis students preferred to learn through experiencing things in the laboratory, shop and on field trips.

3. Overview of Gender Differences in the Learning Style Scales

As shown in Figure 1, the two learning style scales of Authority and Inanimate showed significant gender differences of the same type in the Cree, Dene and Metis cultural groups. These scales may indicate relatively universal gender differences among Cree, Dene and Metis in Northern Saskatchewan. All the scales that indicated significant gender differences in Cree students also appeared to show significant gender

Figure 1

Summary of One-Way ANOVA for Learning Style Differences Between Male and Female Students with Cree, Dene and Metis Backgrounds, and Cultural Differences in Learning Style Scales

Scale	Gender Dif. of Cree	Gender Dif. of Dene	Gender Dif. of Metis	Cultural Dif. of Three Groups
(1) Conditions				
Peer Organization				
Goal Setting	M < F *		M < F *	
Competition				<u>D C M</u> **
Instructor	M < F **		M < F *	
Detail	M > F *		M > F *	
Independence	M < F *		M < F ***	
Authority	M > F **	M > F *	M > F ***	
(2) Content				
Numeric				
Qualitative	M > F **		M > F **	
Inanimate	M < F **	M < F ***	M < F ***	
People		M > F ***	M > F *	
(3) Mode				
Listening				
Reading				<u>D M C</u> **
Iconics		M < F **	M < F *	<u>M C D</u> **
Direct			M > F *	<u>C D</u> *
Experience				
Total Number of Differences	7	4	10	4

Note 1: < and > indicate greater or lower for the means of males and females in each cultural group. Note 2: Groups: C = Cree; D = Dene; M = Metis. Note 3: Groups underlined differ significantly from those underlined separately.

* $p < .05$, ** $P < .01$, *** $P < .001$

differences in Metis. On the other hand, Dene students showed significant gender differences only in the four scales (i.e., Authority, Inanimate, People and Iconics). There were significant gender differences in both Metis and Dene students on the People and Iconics scales.

Comparing gender difference with cultural differences in learning style, the Competition and Reading scales (out of four scales that indicated significant differences among the three cultural groups) did not show significant gender differences within a cultural group. Thus, these two scales may be more culturally attached in terms of learning preference. The Iconics and Direct Experience scales appeared to indicate cultural differences between the three cultural groups and gender differences in Dene and Metis (no interactions of sex and culture were indicated by MANOVA). Therefore, these two scales could be influenced by both factors.

In sum, Authority and Inanimate showed gender differences within each cultural group; consequently, gender differences in these two scales could be universal. Moreover, eight scales indicated gender differences in one or more cultural groups, but did not show cultural differences between three groups. This may suggest that gender differences in Cree, Dene and Metis in these scales are distinct features apart from cultural differences. On the other hand, the Competition and Reading scales indicated cultural differences among three groups, but not gender differences within each of the three cultural group. Thus, these two scales could be affected culturally. The Iconics and Direct Experience scales indicated both gender (but not

within Cree) and cultural differences (no interactions of sex and culture were indicated by MANOVA). But these two scales out of 16 are only ones showing both gender and cultural differences. Thus, the results suggest that gender differences tend to be independent from cultural differences.

DISCUSSION

Research has indicated that Native students process information differently than do non-Native students (Berry 1966 & 1971; Bland, 1975; Kaulback, 1984; Koenig, 1981; Pepper, 1985; Wyatt, 1978). Since Canadian Indians vary in culture and language from tribe to tribe (there are 10 different language families among Canadian Indians), cultural differences between Cree, Dene and Metis backgrounds were tested in this study. It indicated significant differences on the four scales of learning style, all of which suggested that Dene differ from Cree and/or Metis in learning style. According to the results, Dene may be characterized as less negative towards a competitive learning situation (Competition), least negative in reaction to learning through written materials (Reading), and showing less preference for seeing movies, slides, pictures and graphs than do Cree and Metis students (Iconics). In addition, Dene showed less preference for learning by direct experience than did Cree students (Direct Experience). This finding suggests that learning style differences exist between groups of Indian/Metis students (Cree, Dene and Metis), especially between Cree and Dene students. Thus, it is important to realize that not all Native

students, regardless of their tribal culture and linguistic family, share the same learning style preferences.

The major question posed in this study was whether the preferred learning styles of male and female students differ depending on their cultural background. A series of one-way ANOVA revealed that only the Authority and Inanimate scales out of the 16 learning style scales were commonly observed to indicate significant gender differences in Cree, Dene and Metis. Thus, these two scales may be relatively universal beyond the boundary of culture, indicating that males have less preference for studying under a clearly directed instruction by a classroom teacher (Authority) than females do, and that males prefer such work as repairing, building and operating equipment (Inanimate) more than females do.

Comparing the differences of gender and culture, a series of one-way ANOVA indicated that cultural differences in learning styles only partially overlapped gender differences within each cultural group. The results showed that gender differences among Cree students tend to appear also among Metis students, but not Dene students. Since Metis students in this study have a Cree background (they are half-breeds of Cree and European ancestry), and since Cree and Dene differ not only in their cultural background but also in their linguistic background (Cree belong to the Algonquian language family and Dene to the Athabaskan language family), cultural similarity may have influenced the pattern of gender differences in learning styles. This finding may support the theory of cultural variations in sex roles and behaviors (Van Leeuwen, 1978).

Although gender differences in mathematical ability were indicated in a task performance (Benbow & Stanley, 1980 & 1983; Randhawa & Hunt, 1987), the Numeric scale indicated neither gender differences within each group, nor cultural differences between the three groups. Since one-way ANOVA did not reveal significant gender differences on the Numeric scale within any cultural group, preferences of students in learning about numbers may not relate to their performance in mathematical tasks.

The two learning mode scales which concern verbal skills (i.e., Listening and Reading) did not indicate gender differences within culture. Thus, similarly to mathematical ability, preferences of students in verbal or language-related learning activities may not be related to verbal skills. On the Qualitative scale, which tested preferences in learning about words and language, significant gender differences were found in Cree and Metis students in favor of female students. Consequently, gender differences in preferred learning style are observed in learning about language, but not in language-related activities. This may result in gender differences in verbal skills, as indicated by Flinn and Childs (1981).

This study suggested that the learning style scales, which indicated gender differences within each cultural group only partially overlapped cultural differences between the groups. The Authority and Inanimate scales showed gender differences within every cultural group but not cultural differences between those groups. On the other hand, the Competition and Reading scales indicated cultural differences between the three groups, while gender differences did not appear within

any cultural group. There seem to be certain learning styles which are influenced by gender and cultural differences separately. In addition, mathematical preferences of males and females did not support gender differences in mathematical skills. Thus, mathematical skills may result from other factors, rather than preferences of number-related learning context by males and females.

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